antenna 635. The directional antenna 635 transmits the RF signal to the head end 500 on the upstream channel over the link 128.

Performance Management System Overview

5   FIG. 7 is a block diagram that illustrates a performance management system 700 in an example of the invention. The performance management system 700 includes collector systems 710, database systems 720, and reporting systems 730. The collector systems 710 include a channel probe 712, a sector probe 714, a Remote Monitoring (RMON) probe 716, and a Cyber Manager (CM) 10   status 718. The database systems 720 include a market database system 722, a regional database system 724, and a national database system 726. The reporting systems 730 include a market reporting system 732, a regional reporting system 734, and a national reporting system 736.

In this example, the performance management system 700 is an 15   illustration of components related to the performance management within the broadband wireless system 100. The connections between the components within the performance management system 700 are better depicted in FIGS. 1-6. Multiple components such as numerous probes, databases and reporting systems are not shown for the sake of simplicity.

20   The groupings of the probes 712, 714, 716, and 718 in the collector systems 710 are not necessarily elements of the performance management system 700 but are functional groupings used to better explain the operation of the performance management system 700. The groupings of the database systems 722, 724, and 726 in the database systems 720 are not necessarily 25   elements of the performance management system 700 but are functional groupings used to better explain the operation of the performance management system 700. The groupings of the reporting systems 732, 734, and 736 in the reporting systems 730 are not necessarily elements of the performance management system 700 but are functional groupings used to better explain the 30   operation of the performance management system 700.

The collector systems 710 include numerous probes situated throughout the communication network that collect performance information of the communication network. The performance information is information that describes how a communication network is operating. Some examples of

5 performance information are throughput, utilization, delay, modem counts, Signal-to-Noise ratio (SNR), Forward Error Correction (FEC) blocks, FEC correctable percentage, polling ratio, total number of upstream/downstream bytes, average number of upstream/downstream bytes per user, transfer rate, and protocol breakdowns. The database systems 720 store the performance

10 information. The reporting systems 730 retrieve the performance information and provide user-friendly formats of the performance information. Thus, the performance management system 700 provides performance information of the broadband wireless system 100 to characterize traffic, identify bottlenecks, and locate abusive users.

15

Sector Probe -- FIGS. 8-13

The sector probe 695 measures performance of the broadband wireless system 100. In one embodiment, the sector probe 695 measures performance of the broadband wireless system 100 from the customer's perspective. Thus, the

20 sector probe 695 is located in a customer area, such as the customer premises 600, to accurately simulate the customer's perspective. The customer area is any geographic area that contains customers of a communication network. In this embodiment, the sector probe 695 actively generates traffic by executing tests to determine performance of the broadband wireless system 100, as

25 opposed to passively listening to network traffic.

FIG. 8 is a block diagram that illustrates the customer premises 600 including the sector probe 695 in an example of the invention. The additional components in the customer premises 600 as shown in FIG. 6 are not shown in FIG. 8 for the sake of clarity in order to focus on the components related to the

30 operation of the sector probe 695. The customer premises 600 includes the transceiver 620, the splitter 675, the wireless broadband router 690, the sector

probe 695, the wireless broadband router 625, and the computer 691. The sector probe 695 comprises an interface 810, a processor 820, and a memory 830. The transceiver 620 is connected to the splitter 675. The splitter 675 is connected to the wireless broadband router 690 and the wireless broadband

5   router 625. The wireless broadband router 625 is connected to the computer 691. The wireless broadband router 690 is connected to the interface 810. The interface 810 is connected to the processor 820. The processor 820 is connected to the memory 830.

The operation of the sector probe 695 is discussed below in greater detail

10   in FIGS. 9-13. The sector probe 695 is any communication device in a customer area configured to (1) receive an instruction to execute a plurality of tests, (2) execute the plurality of the tests to measure the performance of a communication network, (3) determine performance information from results of the plurality of the tests, and (4) store the performance information in memory 830. In one

15   embodiment, the sector probe 695 is a computer with a 100MHz motherboard, wherein the motherboard comprises an Intel Celeron 433 MHz processor, a 128 MB RAM, a 7.5 GB hard drive, a 3Com 10/100 network interface card, a CD-ROM, a 3.5" floppy drive, and a standard PCI video card. The sector probe 695 runs a Red Hat Linux version 6.2 as the operating system.

20   The instruction could be any message or signal received by the sector probe 695 indicating to execute the tests to measure performance of a communication network. The instruction could be received from the head end 500, the regional aggregation point 400, or from anywhere in the broadband wireless system 100. In one embodiment, the instruction is the execute

25   command to run a program that executes the tests. The test could be any test or script configured to measure performance of a communication network. Some examples of tests are a web surfing test, a bulk file transfer script, a ping test to measure delay, and a raw channel capacity test.

The wireless broadband router 690 exchanges data between the sector

30   probe 695 and the splitter 675. The transceiver 620 converts the data into wireless signals and exchanges the wireless signals in the MMDS frequency